

PROCEEDINGS OF THE
ROYAL ENTOMOLOGICAL SOCIETY
OF LONDON

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ORDINARY MEETING.

WEDNESDAY, 2nd APRIL, 1958, at 5.30 p.m.

AGENDA.

1. Confirmation of the Proceedings of the Ordinary Meeting held on 5th March, 1958.
2. Recommendations of candidates for Fellowship. First reading.
3. Recommendations of candidates for Fellowship. Second reading.
4. Announcement of election of new Fellows.
5. Additions to the Library [see p. 9].
6. Admission of Fellows.
7. Exhibits.

Fellows are particularly requested to bring suitable exhibits to the Meeting even though it may not be possible to announce their intention to do so beforehand.

Note.—To avoid congestion in the Library and to enable exhibits to be displayed to greater advantage, a table has been placed in the meeting-room for this purpose. Fellows are asked to place their exhibits on this table, with a suitable explanatory note, as soon as possible on the afternoon of the meeting, so that they are available for inspection there before the meeting opens.

8. Communications.

1. Miss D. J. Jackson.

Egg-laying and egg-hatching in some species of *Agabus* (Col., Dytiscidae).

[ABSTRACT].

While investigating the biology of *Caraphractus cinctus* Walker, a Mymarid parasitizing the eggs of Dytiscidae, it was necessary to obtain a supply of eggs of water beetles laid throughout the breeding season of the parasite. This entailed an investigation of the egg-laying habits of various Dytiscidae, including several species of *Agabus*.

It was found that *Agabus bipustulatus* L., *A. sturmi* Gyll., *A. nebulosus* Forst., *A. labiatus* Brahm and *A. paludosus* F. possessed soft ovipositor blades, unsuited for cutting plant tissue. These species laid their eggs on aquatic vegetation, fixing them in place with a gelatinous cement, and *A. bipustulatus* frequently inserted them in regular rows beneath the sheathing leaves of *Glyceria*, *Juncus* and *Carex*.

The eggs of these beetles are smooth and transparent, the chorion being a delicate membrane, easily detachable in the early stages of development, and the greater part of the shell is constituted by the vitelline membrane. The eggs usually hatch in about a fortnight. The eggs of *A. sturmi* which are laid in early summer may be heavily parasitized by *Caraphractus*, but the winter laid eggs of *A. bipustulatus* will escape parasitism.

Agabus chalconatus Panz. has a strongly sclerotic, pointed, ovipositor and the eggs are laid in earthen cells in the soil. The eggs are large and opaque and have a remarkably sculptured chorion. The incubation period is lengthy and the larvae can remain in the eggs for many months before hatching.

In *Agabus bipustulatus* the larva emerges from the egg by suddenly jerking its head upwards and outwards. It vacates the egg by a long median slit down the front of the shell and brings the embryonic cuticle out with it. No evidence was obtained that the pair of small spines on the front of the head, commonly known as egg-bursters, serve to rupture the shell. Before hatching, the whole of the larva is surrounded by the embryonic cuticle so that the frontal spines do not come in contact with the shell.

2. Dr. H. E. Hinton.

The pigmented tissue of the Simuliidae.

[ABSTRACT].

The larvae of the Simuliidae and some other aquatic insects have a body-wall cuticle that is transparent or nearly so. These larvae are nevertheless strongly coloured: their cryptic and other colour patterns no longer reside in the integument but in pigmented cells that always lie below the basement membrane. These chromatophores resemble those of some vertebrates, e.g. the melanophores of some Amphibia, in form, behaviour, and selective value. Postembryonic changes in colour pattern appear to depend little or not at all upon changes in the distribution of the pigment in the cells. Changes in colour pattern are to some extent effected by changes in the shape of individual chromatophores, but the more conspicuous changes of pattern involve mass migrations and the formation of new aggregation patterns. Owing to the transparency of the cuticle, epidermis, and blood of *Simulium*, it is possible to make photographic records of the behaviour of individual chromatophore cells over periods of many days. Such records reveal the fact that their shape and spacial relations to one another are unaffected during some moults and ecdyses in parts of the thorax and abdomen.

The relation of the muscle insertions to the distribution of chromatophores was examined. Chromatophores cannot be present between the muscle and the area of the cuticle in which it is inserted. For this reason the colour pattern involves (1) paler spots that correspond to the muscle insertions, or (2) the area of the cuticle in which each muscle is inserted is pigmented, so that the colour of the cuticle here supplies the lack of chromatophores. Great differences in disposition of muscles between one instar and another therefore necessarily impose great differences in the pattern of chromatophores. For instance, the pattern of chromatophores in the pharate pupa of *Simulium* is much like that of the last larval instar, and between the two stages there are no very great differences in muscle insertions. But the enormous difference between the thoracic muscula-

ture of the pupa and adult imposes a more or less complete rearrangement of the chromatophore pattern in the interval between the shedding of the larval cuticle and the insertion of the adult muscles. This rearrangement sometimes requires less than 24 hours, and it takes place while the insect is in its cocoon. In the thorax of the adult, chromatophores are present below areas of pale cuticle and absent below areas of dark cuticle, and this occurs when the distribution of light and dark areas of cuticle does not exactly correspond to the absence and presence of muscle insertions. The factors that initiate and bring to an end the mass migration of chromatophores in the thorax immediately before the insertion of the adult muscles are not known. Symmetrical and asymmetrical blackening of the thorax before and during chromatophore migration had no effect on the symmetry of the patterns finally produced, which were like those of the controls.

TEA will be served in the Library before the meeting.

NOTICES

Forthcoming Ordinary Meetings.

Preliminary notice is given below of the principal papers to be read at the next two Ordinary Meetings.

7th May, 1958.

- (1) **Professor V. B. Wigglesworth.**—Recent work on the Juvenile Hormone.
- (2) **Dr. B. R. Laurence.**—A colour film: "The breeding places of *Mansonioides* mosquitoes in the Gambia."

4th June, 1958.

Mr. W. Haufe (a visitor, Department of Agriculture, Lethbridge, Alberta, Canada).—Two films produced by Science Service, Ottawa: (1) The biting flies [of Northern Canada]; (2) Pollination of alfalfa in Canada.

PROCEEDINGS OF THE ORDINARY MEETING HELD ON 5TH MARCH, 1958.

PROFESSOR O. W. RICHARDS, President, in the Chair.

Present, 50 Fellows and 10 Visitors.

The minutes of the Ordinary Meeting held on 15th January and of the Annual Meeting held on 5th February, 1958, were confirmed and signed by the President.

The President announced that he had nominated Mr. E. B. Britton, Mr. W. V. Harris and Dr. H. E. Hinton as his Vice-Presidents for the coming year.

The names of the following candidates for election were read for the first time: Miss Dorothy Susan Beales, B.Sc.; Mr. Peter Robin Chadwick, M.A.; Mr. Salvino P. Farrugia, B.Pharm.; Mr. C. Garrett-Jones, M.Sc.; Mr. John Marsden Goldsmid, B.Sc.; Professor Khwaja Abdul Haque; Mr. Dennis Stanley Hill, B.Sc.; Mr. Philip Ernest King, B.Sc.; Dr. John Harold Mundie; Professor Eugene Gordon Munroe; Mr. Austin John Pontin, B.A.; Mr. Hafiz Abdul Qayyum; Mr. William Reed; Mr. Jaivant Bhalchandra Sardesai, M.Sc.; Mr. Robert Calder Sneddon; Dr. James Simpson; Mr. Uma Shankar Srivastava; and Mr. Habib A. Zuberi.

For the second time (taken as read): Dr. Wilhelm Büttiker, Ph.D.; Mr. Brian Digby Cooke; Mr. Ezra Ephraim Ethan Donahaye; Dr. Anthony Richard Mead-Briggs, Ph.D.; Mr. Anthony Charles Neville; Mr. John Rawnsley; Mr.

Wilfred Alexander Samarawickrema; Mr. Gerald Thomas Shute; and Mr. Peter Skidmore.

The Secretary read the names of the following newly elected Fellows of the Society: Mr. David Ross Gifford, 66 Kaimes Road, Edinburgh, 12; and Miss Janet Petersen, 1 Elmwood Avenue, London, N.13.

Thanks were voted to donors of gifts to the Library since the last meeting.

Mr. C. A. Collingwood, Mr. P. N. Crow, Mr. R. J. V. Joyce and Mr. N. K. Sylvester signed the Obligation Book and were admitted Fellows of the Society.

Mr. P. S. Hewlett made an exhibit (illustrated by photographs by Mr. J. Hammond) demonstrating secondary sexual characters in *Alphitobius* species (Col., Tenebrionidae). In adults of *Alphitobius laevigatus* (F.) and *A. diaperinus* (Panz.) the male is distinguished by a curved spur at the apex of the mid tibia, whereas in the female both spurs are straight. The hind tibia of *A. laevigatus* shows a similar sexual difference.

The President in thanking Mr. Hewlett stressed the importance of these characters in sexing beetles, because in many species the sexes were almost inseparable without dissection.

Dr. C. A. Clarke and Dr. P. M. Sheppard gave a paper on genetics and race-crosses in *Papilio dardanus* Brown, an abstract of which appeared on pages 1-3.

In the discussion which followed, Dr. E. B. Ford said that this brilliant analysis of the genetics of the various South African forms of *dardanus* offered a solution of a problem which had been outstanding in evolutionary genetics for 40 years. Dr. Clarke and Dr. Sheppard had demonstrated two major points, namely (1) that the characters of the mimetic form, controlled by modifiers within the ambit of a major switch gene, have been perfected by gradual evolution; and (2) that the various forms are apparently governed by a system of multiple allelomorphs. It was however probable that these were not multiple allelomorphs but really supergenes, i.e. a group of genes brought so close together on the chromosome as to be transmitted as a unit.

This kind of work had great significance when applied to plants and animals and also to the human species. It would throw light on human blood groups, where he expected that a series of supposed multiple allelomorphs would also in fact be found to be supergenes.

In answer to a question by the President regarding the two non-mimetic forms, Dr. Sheppard suggested that they were probably maintained by some advantage other than their appearance but might derive some protection from the models. They were too common to be due to recurrent mutation.

Dr. J. R. Busvine mentioned some less precise genetical experiments on the insecticide resistance of two stocks of *Aedes aegypti* from Trinidad and Haïti. In normal crosses the results were reasonably consistent with control by a single gene. In reciprocal crosses, the F1 and F2 generations were definitely less resistant than either of their parents. He asked if this could be explained by the presence of modifying genes. Dr. Sheppard said he thought it well might be and referred to Dr. Ford's work on the forms of the Lesser Yellow Underwing in the Hebrides and in Orkney, in crosses between which he showed that the dominance broke down because it resulted from the action of different modifiers in different areas.

The President said that *dardanus* was of course a particularly good insect for use in such studies. It might be hoped that the results would be generally applicable and could be extended to other less manageable insects.

In reply to a remark by Mr. C. N. Hawkins that in *Bombyx mori* the same

gene operated with different potency in different races, Dr. Sheppard said that in *Lymantria* sex seemed to be controlled by genes of this kind.

Dr. L. P. Brower (a visitor from Yale University, now at the Department of Zoology and Comparative Anatomy, University of Oxford) said that the mimetic pattern appeared to break down in some butterflies in areas where the model did not occur, an example being the model butterfly, an *Aristolochia* feeder, *Battus philenor*, which occurs with increasing frequency from New Jersey southwards but in southern Florida again begins to become rare. The mimic butterfly has two colour forms: the black mimic which is found in high frequency where the model is common, but both south and north of the area in which the model is common, the black mimetic female form becomes rare or absent.

Mrs. Brower (a visitor) said that she had made three experiments with birds and butterflies using the same birds: the first series was with light brown models (Monarch butterflies) and light brown mimics (Viceroy butterflies). The birds refused to eat the model and when the mimic was substituted they also refused that on sight alone. The second series was done with black models and mimics and this was followed by the third series with dark brown models and mimics. The birds which refused the light brown model and were fooled by the light brown mimic apparently generalised from their previous experience in the first experiments and now refused on sight alone to touch either the dark brown mimic or model.

In reply to a comment by the President comparing this with Müllerian mimicry, Mrs. Brower said that she could not say whether the mimicry was Müllerian or Batesian in every case.

Mr. Hawkins having suggested that it might be the presence of colour rather than a particular pattern that frightened the birds, Dr. Brower said that recent work at Oxford had shown that birds could discriminate pattern quite finely.

PAUL FREEMAN, *Honorary Secretary.*

The next meeting will be held on 7th May, 1958, at 5.30 p.m.

ADDITIONS TO THE LIBRARY.

Presented.

- Audy, J. R. *ed. Malaysian parasites.* XVI-XXXIV. 8vo. Kuala Lumpur, 1957. [*Stud. Inst. Med. Res. Fed. Malaya* 28.] [Mr. J. L. Harrison.]
- British Museum (Natural History). Economic Series 4a. *British mosquitoes and their control.* (1925.) 4th ed. 1958. [Pamphl.] [The Trustees of the British Museum (Natural History).]
- Les Lépidoptères de l'Afrique noire française.* I. *Introduction*: A. Villiers. II. *Papilionidés*: A. Villiers. III. *Lyceanidés*: H. Stempffer. 8vo. Dakar: I.F.A.N., 1957. [*Initiations Africaines* XIV.] [London School of Hygiene and Tropical Medicine.]
- Regnum Vegetabile.* Vol. 10. *International code of nomenclature for cultivated plants*, 1958. 8vo. Utrecht: Internat. Bur. Plant Taxonomy, 1958. [Pamphl.] [Royal Horticultural Society.]

Purchased.

- Busvine, J. R. *A critical review of the techniques for testing insecticides.* 8vo. London: Commonwealth Institute of Entomology, 1957.
- Hering, E. M. *Bestimmungstabellen der Blattminen von Europa.* Bd. II. *Pflanzengattungen M-Z.* 8vo. 's-Gravenhage: Junk, 1957.

- Stäger, R. *Die Baukunst der Insecten*. 8vo. Bern : Kümmerly & Frey, 1957.
- Singer, K. *Die Käfer (Coleoptera) Beiträge zur Fauna des unteren Maingebietes von Hanau bis Würzburg mit einschluß des Spessarts*. 8vo. Aschaffenburg. 1955. [*Mitt. naturw. Mus. Stadt Aschaffenburg* (N.F.) 7.]
- Stichel, W. *Illustrierte Bestimmungstabellen der Wanzen. II. Europa. (Hemiptera-Heteroptera Europae)* Vol. 4, Hft. 4. 8vo. Berlin-Hermsdorf, 1958.
- Wytsman, P. ed. *Genera Insectorum*. Fasc. 212. *Diplura* : J. Paclt. Fol. Anvers, 1957.

In addition, separates have been presented by the United States Department of Agriculture ; Professor W. Roepke ; Dr. J. L. Cloudsley-Thompson ; Rev. E. J. Pearce ; Mr. F. N. Wright ; Mr. C. A. Collingwood ; American Entomological Society ; Dr. T. E. Mittler ; Rev. C. E. Tottenham ; South African Institute for Medical Research ; Dr. A. Neboiss ; Director, E.A.T.R.O. Tororo ; Bee Department, Rothamsted Experimental Station ; Commonwealth Institute of Entomology ; Mr. W. V. Harris ; Anti-Locust Research Centre ; Mr. W. N. Beesley ; Department of Agriculture of Canada ; Mr. P. S. Sekhar ; Mr. E. B. Basden ; Mr. F. H. Jacob and Professor G. C. Varley.